permanently bonded prosthesis by replacing the hemispherical ball portion of the abutment with a conical abutment."

This dual purpose, the temporary or provisional mini-pin of approximately 2 mm in diameter, with removable hemispherical upper half-ball head in place, is installed through the soft tissue into the bone to secure dentures from lifting or sideways motion during chewing. Downward (occlusal) forces are borne by the conformal denture lining. The dentures can be removed for cleaning or repair by lifting from the ball heads of one or more minipin implants. The underside of the denture is lined with a soft polymer that forms, during molding in place upon the soft tissue, a flexible socket that snaps over the ball head.

At a future date, the top half of the ball head can be replaced by a truncated, conical abutment, for a more permanent cemented-in-place prosthesis instead of the removable denture.

The minipin implant has the advantage of immediate loading to secure the denture without the long healing and incorporation time required of a convention 3 to 7 mm diameter implant fixture and healing hardware. The minipin implant is installed at the time the denture is lined with polymer and fitted. The resilient polymer lining is allowed to cure around the ball head of the minipin implant. When cured, the polymer liner remains flexible enough to snap on and off of the underlying minipin ball head. The minipin with

the exchangeable top half of the head accommodates either the removable denture or the more permanent cemented in place prosthesis on the same installed implant fixture.

While neither the minipin nor conventional implants are new, the combination of the 2mm minipin implant with interchangeable heads has not been shown by other inventors.

Examiner's objection base on 35 USC 102 is answered as follows:

In Greenberg (US PAT #5,599,185), the standard abutment is shown with an additional screw for attaching to a standard width implant fixture. This additional screw extends within the narrow portion of the implant fixture embedded within the bone. Applicant's minipin implant fixture has a solid shaft in the portion embedded with the bone. The 2mm diameter minipin would lose necessary strength by having a hollow threaded blind hole in the manner shown by Greenberg.

Applicant's hemispherically flared head is all of one piece with the minipin implant. A short threaded blind hole, which does not extend through the hemispherical portion of minipin implant, preserves the necessary strength in the embedded portion of applicant's design. Further, Greenberg does not anticipate immediate loading of a narrow diameter minipin implant, but relies upon an extended healing time to incorporate his standard diameter implant.

It is the view of the applicant that the prior art should teach in sufficient detail a method and apparatus that will accomplish the function stated in the present application. Form will follow function if the prior art is directed toward the function desired. Greenberg is not intending to install immediately loaded minipin implants with interchangeable abutments, therefore, he does not think to provide a solid implant shaft. Greenberg teaches an adjustable healing cap 84 and over-cap 86 to conform the healing soft tissue to a shape suitable to the final prostheses to be installed at a later date after osteo-integration. Applicant does not rely upon a lengthy healing time. Instead, applicant desires that the minipin be used immediately to secure the overcase.

Furthermore, referring to Greenberg Figure 20, an additional collar 130 is incorporated to set a fixed angle and prop up the conformal healing cap and overcap. Applicant is troubled by the apparent inability of widened portion of screw head 89 to hold the cap and overcap in place in the oversized holes provided 104 and 114 since the screw head bears tangentially on the inner rim of these through holes in one place only. The cap and overcap will slip out of place in the currently described embodiment.

Greenberg does not intend his healing abutment to support a removable denture or a provisional, cement-in-place prostheses. His invention, as taught, will not do so.

Examiner's objections based upon 35 USC 103(a).

In Daftary et al #5,145,372 elements described and shown in his drawings differ substantially with applicant's submission. Daftary'372 Fig. 1 shows a cross section of a standard implant fixture 28 having an internally threaded, blind hole within a hollow portion 18.

The proximal end 33 of the healing screw 30 extends deep within this hollow portion. Similarly, Daftary'372 Fig. 2 shows the long threaded shaft 62 with distal end 61 extending deeply within the implant fixture hollow portion 18. Applicant teaches an implant fixture with no internal hollow extending within the bone to prevent the weakening of the shaft. The shaft portion of applicant's invention is solid and of minimal diameter in the region surrounded by bone.

In addition, Daftary'372 includes the need for healing caps as illustrated in Figures 3-5. His invention does not anticipate immediate loading of a provisional implant. Instead, he relies upon an unloaded healing period for the integration of the implant fixture within the bone with the soft tissue sutured over the implant. The healing caps are required to provide a soft tissue profile to match the final abutment and to prevent the tissue growing within the implant or abutment.

Applicant, in his Figure 1 shows a minipin implant 1 with solid threaded shaft 5 with a flared soft tissue profile region 7 and a hemispherical head 8. The threaded internal blind hole 11 does not extend into the solid shaft region 5. Applicant teaches a two element final assembly with a solid minipin implant and an interchangeable top element.

Daftary'372 teaches a three or more element final combination of standard implant fixture, mountable abutment and separate retaining screw. Further, Daftary requires a healing period and a heading cap to allow for osseointegration. Applicant does not need a healing cap for immediate loading and does not claim a healing cap since no healing period is required.

Daftary Figures 10 and 12 show a healing cap in perspective and cross section. The threaded portion 314 is intended to mate with the internal threads of a standard diameter implant having a central, hollow threaded blind hole and do not directly mate with bone.

As in Daftary'372, Gittleman (USPN 5,967,781), teaches in Figures 14 and 15, a standard diameter, implant fixture 1 having a centrally threaded blind hole to accommodate a threaded shaft 23 on an abutment 12. This abutment has an apparent hemispherical region 26 that is part of the detachable abutment 27 not part of the minipin implant. Gittleman'781 does not teach a solid minipin implant for immediate loading with an integral hemispherical head, but relies upon compression screw 23 to hold the abutment to the implant fixture 1. These extra parts and assembly actions in the prior art are suitable for standard diameter implants, not minipin implants.

Gitlleman'781 is claiming an abutment with adjustable riser, not an implant fixture with a narrow diameter and interchangeable heads for immediate loading. These differences in

structure and intended use negate obviousness. Applicant discloses and claims a simpler apparatus to provisionally secure a denture or overcase in one or two chair sittings. Gittleman'781 in light of Daftary'372 does not suggest the desirability of performing these functions and does not point those skilled in the art to look in the direction of disclosing necessary apparatus or methods to accomplish these aims.

The shape of the minipin fixture head is important. The hemisphere shaped top of the abutment provides a ball-in-socket, snap fit into a resilient polymer under-lining used to cushion a denture against the edentulous soft tissue. By snapping the denture over the spherical head, the denture is prevented from moving laterally or lifting up during chewing. The truncated cone abutment anchors the implant to a cemented provisional prostheses with a tapered fit. The prosthesis can be removed by breaking the cement and sliding the tapered surfaces apart. A prostheses cemented over a ball head would be much more difficult to remove. The cement will lock around a ball head. It is the intent of the applicant to offer two abutment types to meet both these differing conditions. The truncated cone abutment allows the cement to be parted in removing an overcase.

Claim 9 places a cement relief groove to aid in the proper seating of a cemented prosthesis to prevent entrapped air from weakening the glue joint or forcing the prostheses to rise up from trapped air pressure. The relief groove as a modifying element in a dependent claim would not be apparent to those skilled in the art since the concept of a detachable minipin abutment, with or without a groove, has not been disclosed by others. It would not be obvious to those skilled in the art to place a relief groove in an cemented abutment

attached to a minipin implant fixture if, to begin with, they had not conceived of a removable abutment attached to a minipin implant fixture.

Objections to Claim 5 and 13-14 are answered as follows. Niznick (USPN 6,287,117) teaches a standard diameter implant fixture having an internally-threaded inside shaft 101 that extends in depth within the portion of the implant fixture embedded within the bone. Applicant, in order to preserve the smaller diameter of the minipin implant, does not have a shaft of this depth. A shaft of this depth would be contrary to maintaining the strength in a narrow diameter, solid implant. Niznick'117 is not disclosing a self-tapping minipin implant apparatus that has a solid diameter within the bone. Niznick'117 is not teaching self-tapping external threads on a minipin implant.

Niznick'117 does not teach flats for driving and holding a wrench on a minipin implant fixture. Since the concept of a minipin implant is not disclosed or claimed by Niznick, his application of a self-tapping thread and a flats for driving these implants are located on or within the implant itself and extend to within the portion of the implant embedded within the bone. Applicant requires his internal flats to be within the abutment itself. In Figure 1 applicant has internal hex 14 to drive the complete minipin implant 1 and upper half of the spherical abutment 2 into place within the bone. Alternately, the truncated cone abutment 3 is driven in combination with the minipin implant by means of the internal flats within recess 19. Threads 26 on shaft 13 of the hemispherical abutment 2 or on shaft 16 of the truncated conical abutment 3 are mated with the threaded blind hole 11 in the

minipin implant head 8. Detents 9 provide a means to engage the minipin implant fixture for removal. These detents are above the soft tissue line.

In a similar fashion, in applicant's Figure 4, a solid minipin implant is provided with flats 38 and 39 to effect installation and removal. This is intended to be a one-piece implant with detent groove 42. In applicant's Figure 5, external driving flats 58 are located on the external surface on the solid minipin implant above the soft tissue margin to effect the installation and removal of the implant. Abutment 68 is provided with external flats to help orient the abutment retaining screw 66 is installed since the abutment is provided with off-axis mounting adjustment. In neither Figure 4 nor Figure 5 do the driving flats reside below the soft tissue line. In Figure 5, the mounting screw 66 does not extend within the minipin implant portion embedded in bone. Unlike Niznick'117, blind threaded hole 54 does not extend to within the portion of the implant embedded within the bone.

In Daftary'372 in view of Klardie et al (USPN 5,782,918) applicant finds that Klardie does not disclose a solid minipin implant fixture. Klardie teaches an apparatus to secure an abutment to an implant using an expandable segmented abutment end and internal expansion screw. Klardie details in his drawings Figures 1 and 2, the expandable abutment element to secure his abutment to a standard width implant with an internal bore extending below the surface of the bone. This means of attachment, like that of Daftary, and unlike the applicant, fails to incorporate a solid minipin implant fixture that has a solid cross section in the region of the bone. Thus neither Daftary nor Klardie'918 anticipate applicant's invention. In Klardie, the circumferential grooves to "facilitate cementing" are

mere shallow scribe marks, as shown in drawing, of insufficient size and shape to secure an o-ring. His stated intent is for these slight grooves to aid in cement retention of a prosthesis (Klardie'918, column 4, line 15-19). Klardie's drawings offers an unlabeled, flat surface on the superior end of his abutment without comment in his specification or text. There is no indication that this element is intended for hydrostatic relief. It is just as likely that the flat is to prevent the mating prosthesis from rotating in place. In that case, there would be no space over the complete inner face of the abutment to prevent rotation and misalignment of the prosthesis. Unlike applicant, no separate groove is shown in this flat face for hydrostatic relief.

In Daftary (USPN 5,362,235), an offset detachable abutment is shown in Fig. 23 that substantially differs in the appearance and application to that of applicant. Daftary'235 does not have an indented groove or necked-in region to for an o-ring and cast-in-place flexible estomeric polymer. Daftary does not have the external flats 59 on the abutment to aid in alignment shown in applicant's Figure 5. Daftary'235 does not shape the distal end of his abutment into a tapered region 60, in applicants Figure 5, to allow the easy mounting and dismounting of a mating denture. Parallel placement of multiple abutments are required for the easy removal and insertion of dentures over the minipin abutments.

Daftary'235 relies upon a standard implant fixture with a hollow threaded core extending within the bone to accommodate his mounting hardware. His retaining screw 402 extends well within the implant fixture 106 embedded deep within the bone 104. Applicant relies upon an implant with a solid core in the region embedded within the bone. Additionally,

Daftary'235 relies upon a second screw 402 mated with fixture screw 452 to hold the abutment in place. Each added piece of hardware increases the chances of parts working loose and increases manufacturing costs and chair time for the dentist.

Applicant will welcome any suggestions the examiner can offer in strengthening applicant's claims without encroaching on the claims of others.

Respectfully submitted.

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